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(19) (CA) APPLICATION FOR CANADIAN PATENT (12)

(54) Concrete Block for Retaining Walls

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Notice: The specification contained herein as filed

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## CONCRETE BLOCK FOR RETAINING WALLS

Abstract of the Invention

A concrete block particularly directed to the construction of retaining wall systems, characterized particularly by a step back frontal surface which includes a frontal surface having a flat decoratable portion over a substantial vertical dimension thereof and tapered rearwardly and vertically from such frontal surface to a top planar surface with an interlock area behind such surface to receive additional blocks thereon to create a wall. This interlock area provides a flat planar block locating surface for the positioning of a next vertical block and when the blocks are arranged in vertical relation on top of one another a step back frontal surface is provided. Combination drainage and tie-back anchor apertures are provided in the rear vertical surface of the block. The block includes weight reducing passages vertically therethrough which also accommodate vertical tiers. The block may include rearwardly and inwardly directed sides such that adjacent blocks are joinable to form a curved frontal surface of the constructed wall. The interlock of the blocks creates a strong barrier wall which affords an artistically conceived frontal surface. The design of the blocks provides for a vertical and horizontal tying of the blocks through reinforcing bars or other means.

Field of the Invention

This invention relates generally to concrete block structures and particularly to a concrete block joinder system for erection of retaining walls without mortar and which provides for an interlock of the blocks such that the resulting wall provides an inclined support and earth barrier.

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Short Summary of the Invention

10           This invention relates to a concrete block as the basis for a system for building of retaining walls and the like. The block is characterized by a generally flat rectangular surface for placement onto the ground or other bearing foundation and for placement onto lower blocks in  
15           erecting the wall. The block is further characterized by a frontal flat or decoratable surface having a rearwardly and upwardly directed upper portion terminating in a flat planar top with this frontal portion defining a rearwardly positioned notch and next block locating area. The upper  
20           surface of the block defines the locating portion as being a flat surface with a vertical ledge formed by a frontal, rearwardly directed portion such that blocks may be placed on top of one another and when so placed, an inclined front decorative surface is provided with an upper block inter-  
25           locking with the next lower block. Applicant's block also

incorporates weight reduction passages vertically therethrough which permit the insertion of vertical connecting rods between vertically adjacent tiers or rows of such blocks. In addition to the lightening apertures a rearwardly extending passage is formed through the rear vertical surface of the block to permit the installation of earth tie-bars into the block. The vertical and rearward connecting means may be combined. These rear apertures also serve as weep holes or drainage holes to permit water to drain from the interior of the block should water accumulate within the erected wall.

Applicant's block for a complete wall system may take several configurations with a first unit being a straight line block for the erection of straight walls with a second version providing rearwardly and inwardly directed sides such that adjacent blocks within any given row or tier, when abutted in side-by-side relation will form a curved surface to the frontal exposed wall area. Another version of the block includes corner elements where the inwardly and upwardly directed frontal surface is provided on at least the front and one adjacent side of the block. This version permits corner construction and continuance of the decorative front area about and around corners of various angles.

When completed, a retaining wall formed from the blocks embodying the applicant's concept provides an inclined frontal surface and an inclined rear surface

matching the frontal surface with the frontal surface providing a decorative and artistic arrangement.

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Background and Objects of the Invention

5           Applicant is aware of many commercially available concrete blocks for the construction of retaining walls and the like. In reviewing the commercially available art he has not found any block which incorporates the advantages and interlocking abilities as contained  
10       herein.

          Applicant has also searched the applicable patented art and has found the following listed United States Patents: Heinmann, No. 4,229,123; Schmitt, No. 2,313,363; Clarke, No. 4,081,969; Fiaber, No. 3,282,056; Upson,  
15       No. 982,697; and Perada, No. 4,426,176.

          Of this prior patented art it would appear that only the Heinmann and Schmitt patents include the concept of a seating and interlock area for the joinder and connection of vertically adjacent rows or tiers of  
20       blocks.

          The Schmitt patent utilizes the interlocking edge on the rear downwardly depending corner of the blocks such that an upper block will have a downwardly depending side to abut against the top of a lower tier of blocks.  
25       This structure then provides a frontal surface which is

entirely flat and which may be, as illustrated in Schmitt, decorated in various forms to simulate brick or stone structures.

5 The Heinsmann patent illustrates a block to provide a support surface and a front locking surface for the next vertically adjacent row of blocks. The unit also provides for inversion of rows of blocks wherein this capturing lip or notch may be positioned in downwardly extending location over the rear of a lower tier of blocks.

10 The Heinsmann patent does not consider frontal decorative situations and only provides a flat front surface which, when a wall is erected provides a series of straight, stepped elements. Heinsmann embraces the concept of "loose tiers" and strongly suggests vertical spacing be-

15 tween tiers. Heinsmann does not allow for either vertical or horizontal tie-in and does not consider drainage from behind the wall and into the wall.

None of these patents provide a decorative effect as obtained through the tapered, decoratable forward surface provided by applicant and none of these patents consider the

20 utilization of tie bar accommodations such that the constructed wall may be tied both vertically and into the earth to be retained. In addition, none of these patents are concerned with the alleviation of water that may accumulate interiorly

25 of the blocks.

It is therefore an object of the applicant's invention to provide a concrete retaining block unit for retaining walls which provides an interlock between vertically adjacent tiers of the blocks in constructing the wall.

5 It is a further object of the applicant's invention to provide a concrete block for the construction of retaining walls and the like which includes a frontal surface having an inwardly and upwardly directed portion at the upper edge of the frontal surface to provide a decorative frontal arc and having a flat receiving surface therebehind to receive the next vertically adjacent block thereon and interlock the same to provide a rearwardly directed and inclined frontal surface for the constructed wall.

10 It is a further object of the applicant's invention to provide an interlocking concrete block structure having weight reducing apertures arranged vertically therethrough which will also permit the passage of vertical tie bars between blocks and having a rear aperture therethrough designed for drainage of water from the interior of the blocks and also provide for a dual operation of tie bar installation wherein a tie bar may be inserted into the soil behind the wall and connect the wall thereto and further providing for interconnection of both

tie bars.

It is a further object of the applicant's invention to provide a concrete block as the basis for a retaining wall system which includes a block specific to corner installation.

It is a further object of the applicant's invention to provide a method for manufacture of retaining wall blocks which includes molding of two blocks in face-to-face relation and splitting the blocks to provide a decorative surface to a front surface of the block.

Short Description of the Drawings

Figure 1 is a perspective view taken from the rear side of a retaining wall constructed from concrete blocks embodying the concepts of the applicant's invention;

Figure 2 is a front elevation view of the blocks;

Figure 3 is a top plan view of the blocks, including, in phantom lines, a horizontal and a vertical tie back;

Figure 4 is a side elevation thereof;

Figure 5 is a rear elevation thereof;

Figure 6 is a front perspective of the applicant's block; and

Figure 7 is a rear perspective view of a block embodying the applicant's concepts and provided for



corner installation.

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Description of a Preferred Form of the Invention

In accordance with the accompanying drawings  
5 the concrete block as the basis for a retaining wall system  
embodying the concepts of the applicant's invention is  
generally designated 10. A modified form of the block  
particularly adapting the same for corner installations  
is generally designated 11 as illustrated in Figure 7  
10 and this form will be described after the description  
of the first, what may be termed straight line form of  
the invention. Another modification of the block 10  
is shown by the dotted line configuration of Figure 3  
and this form will be described hereinafter and is design-  
15 nated 12.

A typical wall section as constructed from a  
plurality of the straight line blocks 10 is illustrated  
in Figure 1. The wall W, as illustrated in Figure 1,  
shows the interlocking arrangement for the blocks 10  
20 particularly to show the inclined frontal surface and inclined  
rearward surface of the completed wall W.

The block 10 is generally rectangular in shape  
and of a predetermined height and, as best illustrated in  
the side elevation of Figure 4 includes a bottom surface  
25 15, a rear side 16, a frontal surface consisting of a

rearwardly and upwardly directed portion 17a and a vertical portion 17b and end surfaces 18-19 in normal arrangement to the frontal surface 17b or which may be angularly arranged thereto as will be further described with consideration of form 12. The uppermost surface of all forms of the block 10, 11 and 12 is divided into two distinct areas designated respectively 20a-20b with a vertical dividing shoulder 20c arranged therebetween. The area defined by a flat top surface 20a with vertical shoulder 20c provides an interlock area for the next vertically oriented block received thereon.

As particularly illustrated in Figure 3 lightening or weight reduction passages 21a-21b are provided vertically through the block 10 and a pair of apertures or passages 22a-22b communicate with such passages 21a-21b through surface 20a to define a passage from the weight reducing areas 21a-21b through the rearmost surface 16 of the block. The block 10 then provides a primary support base 15 which is positioned on the ground or other foundation surface with the next vertically oriented tier of blocks being arranged in the interlocking area formed by the surfaces of the top 20a, 20b and 20c. In this particular arrangement it should be obvious that the weight reducing passages 21a-21b of several vertically oriented blocks will be in general alignment for either filling of the same with dirt

or other materials or for the insertion of vertical tie elements such as re-bars or the like. These apertures 21a-21b then perform a dual function in initial weight reduction of the block for ease of handling thereof and  
5 ultimate filling thereof or tying of vertically oriented blocks to one another.

Apertures 22a-22b passing from the weight reducing passages 21a-21b through the rear surface of the block serve a dual function. These apertures or passages or  
10 channels 22a-22b serve as fluid or water relief holes for the drainage of any accumulated water from the interior of the formed wall into the adjoining dirt or alternatively form a channel into which an anchor may be placed for tying the entire formed wall into the adjoining dirt which is  
15 to be retained. Such tie-bars are normally referred to as dead heads and many forms of anchoring devices are available and the channels 22a-22b accommodate the various tie in units.

Figure 3 illustrates the utilization of vertical V and horizontal H tie bars which aid in maintaining vertical  
20 alignment of the blocks 10 and tie-in of the completed wall system into the earth to be retained. These articles V, H are illustrated in phantom lines as being suggestive of tie-in utilization. As illustrated in Figure 3, a vertical tie bar V may pass through aligned apertures 21a-21b of the  
25 block 10 or, as illustrated in the right aperture 21b of

the block 10 the vertical V tie bars may be interconnected with a horizontal H tie bar with the tie bar H having a receiving aperture formed on one end thereof. Such tie bars are readily available in the art. In the combinative effect a- illustrated in the passage 21b the vertical tie V passes through the aperture in the horizontal tie H for the desired combined vertical and horizontal tie situation. Obviously the horizontal tie H may take many forms and is commonly known as a "dead head" member. This particular combinative useage is only available with a block having the vertical passages 21a-21b and the combined drainage tie bar passages 22a-22b.

The frontal surface 17 of the block, consisting of the upwardly and rearwardly defined surface 17a and vertical surface 17b provides a decorative effect to the block and further reduces the possible area of accumulation of material on the frontal and upper surface of the block. In the prior art situations blocks that provide such an upper interlock surface also provide a flat ledge upon which debris, dirt, water and the like may accumulate. By providing the sloped surface 17a a more pleasing decorative effect is obtained and the accumulation area is substantially decreased.

Applicant's method of molding the individual blocks 10 results in a new method of manufacture to obtain

a particular decorative surface on the vertical section 17b of the frontal area 17 of the block 10. Two blocks are molded as a single unit with the surfaces 17b being formed after molding. Obviously in a molded two part unit the tapered surfaces 17a of two facing blocks provides a "splitting" channel. Simply cracking the blocks along the meeting surfaces of the tapered portion 17a results in the blocks splitting to form surface 17b. The result of such splitting will provide an open aggregate surface and thus a decorative surface for each of the molded blocks. It is felt that this method for providing the frontal decorative surface is unique in the art as most exposed aggregate surfaces are obtained either through sandblasting or exposed aggregate molding techniques.

It should be obvious that a retaining wall utilizing a straight line block simply requires the forming of a foundation surface for the lower block and placing the blocks in a single tier in a side by side relation with the next tier of blocks being positioned in the receiving notch area of the block 10.

In order to form a curved front surface the sides 18-19 may be directed to converge inwardly as illustrated by the dotted line configuration, designated 12 in Figure 3. Obviously this same modification could be provided to include sides 18-19 which would converge in

a forward direction such that curvilinear effects of both convex and concave design would be attainable. This requires a slight modification from the normal side elements in the straight line arrangement.

5           A further modification of the applicant's unit is designated 11 and illustrated in Figure 7. In this form of the invention the frontal beveled surface 17a is provided on two surfaces of the block such that a corner effect is attained. As illustrated in Figure 7,  
10   on such a block, there are two frontal vertical surfaces 17b arranged at right or a selected angle to each other with the inwardly directed surfaces 17a accommodating this same angularity. Obviously this corner configuration could be provided for both a right and left hand corner.

15           It should be obvious that the applicant's block has certain unique features and serves as an element in a system for the construction of retaining walls. The straight line configuration permits simple straight walls with the combination of the corner elements permitting continuation  
20   of the wall about corners while the converging and diverging side structures permit the construction of curvilinear walls. The tie, both vertical and horizontal, provide for positive joinder of the blocks 10 not only to one another but also to the earth to be retained. The combinative effect of the  
25   vertical and horizontal ties offers a very positive method

for vertical and horizontal tying of a completed wall. The horizontal channels through the rear of the blocks lead into the vertical passages of the blocks provides means for draining water from the retained earth. The cause of wall collapse is very often the accumulation of water behind the wall and with this structure drainage of such water is achieved.

- Use of the applicant's block should be obvious and the interlocking, interconnecting thereof should similarly be obvious. The various dimensions of the block may be modified to any configuration without departing from the scope of the invention.

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What I Claim Is:

1. A concrete block for use in construction of retaining walls and the like, said block including:

5 a. bottom, top, rear, side and frontal surfaces;

b. said bottom, rear and side surfaces being generally planar and arranged generally normal to one another;

10 c. said top including a first support area defined over a predetermined area of said top for the support of additional blocks, a vertically extending shoulder adjacent said frontal surface of said block and a second top surface at the uppermost end of said extending shoulder;

15 d. said frontal surface defining a lower vertical portion normal to said bottom and an upper, rearwardly inclined portion extending from said vertical portion terminating at said second top surface; and,

20 e. said support area and said vertical shoulder providing a locating surface to receive an additional vertically positioned block therein wherein the additional block is positioned rearwardly from the front of the receiving and supporting block whereby a wall of tiers of  
25 such blocks extends rearwardly and upwardly from a support surface.



2. The block structure as set forth in Claim 1 and at least one vertical aperture is provided to extend from said first support area of said top surface to said bottom surface for weight reduction of the block during construction and for filling and block connection means following construction of a retaining wall.

3. The block structure as set forth in Claim 2 and a pair of vertical apertures being provided in side-by-side relation through said block.

4. The block structure as set forth in Claim 2 and channel means formed in said top support area of said block extending from said aperture through said back surface thereof for placement of earth connecting means therein whereby the constructed wall may be tied to the earth to be retained.

5. The block structure as set forth in Claim 3 and a channel means formed in said top support area of said block extending from each of said apertures through said back surface thereof for placement of earth connecting means therein whereby the constructed wall may be tied to the earth to be retained.

6. The block structure as set forth in Claim 1 and said side surfaces being inwardly and rearwardly directed with respect to said frontal surface whereby joined adjacent blocks will effect a generally curved surface to a formed

retaining wall.

7. The block structure as set forth in Claim 1 and said side surfaces being outwardly and rearwardly directed with respect to said frontal surface whereby  
5 joined adjacent blocks will effect a generally curved surface to a formed retaining wall.

8. The block structure as set forth in Claim 1 and,

a. said top including a second vertically  
10 extending shoulder adjacent one of said side surfaces of said block and in general horizontal alignment with and normal to said vertically extending shoulder adjacent said frontal surface of said block and said second top surface extending thereover; and,

15 b. one of said side surfaces defining a lower vertical portion normal to said bottom and an upper, rearwardly inclined portion extending from said vertical portion terminating at said second top surface whereby the block provides a corner structure with an upper block  
20 locating surface and a continuous sloped frontal surface configuration.

9. The block structure as set forth in Claim 5 and:

a. said channel means communicating with  
25 said vertical apertures.

10. The method of providing a concrete block including:

5 a. providing a mold to receive concrete and form the same therein, said mold including the shape and characteristics of two of the blocks and meeting in a common face;

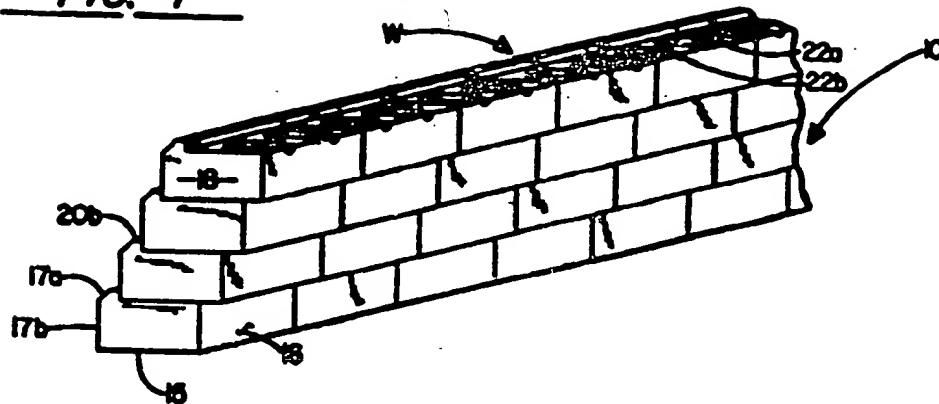
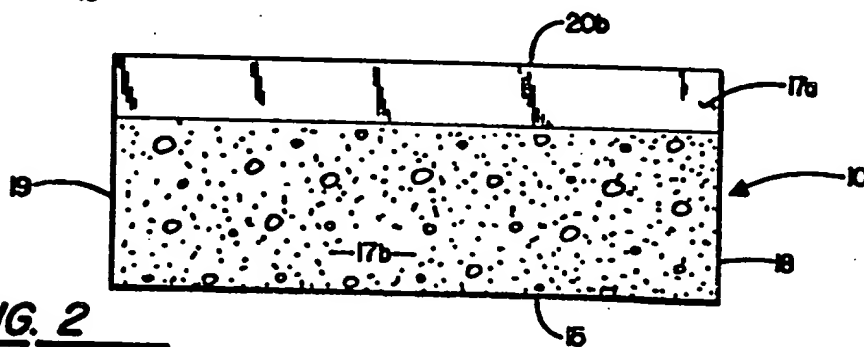
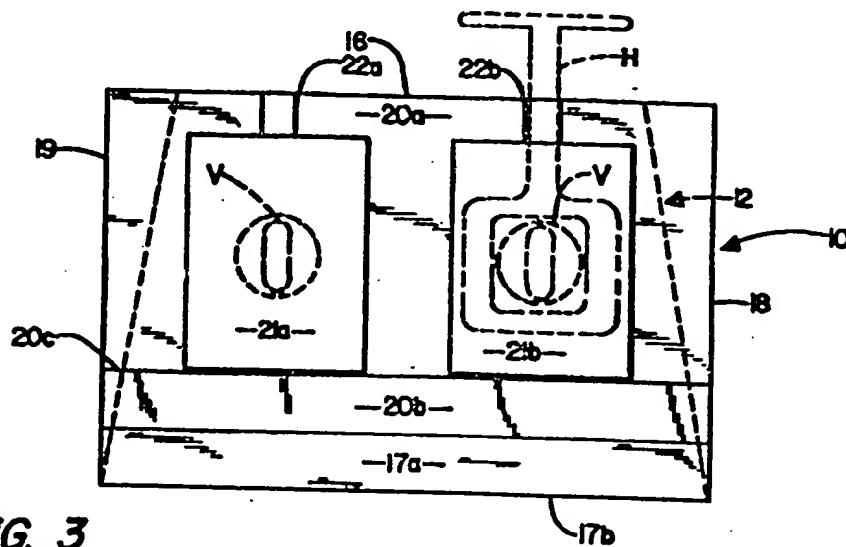
b. filling such mold with concrete for hardening and setting thereof; and

10 c. splitting said formed concrete into two singular blocks along and through the common face thereof to provide two blocks having an exposed aggregate surface.

11. The method for manufacturing a block as set forth in Claim 10 wherein said common face of said  
15 mold includes a V-shaped channel at the common face thereof whereby the splitting will occur along a plane in substantial alignment with the apex of the V channel.

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FIG. 1FIG. 2FIG. 3

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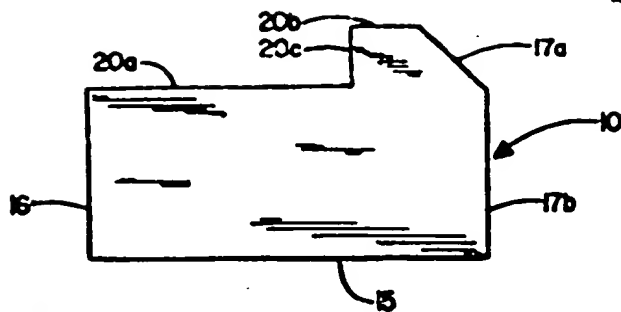


FIG. 4

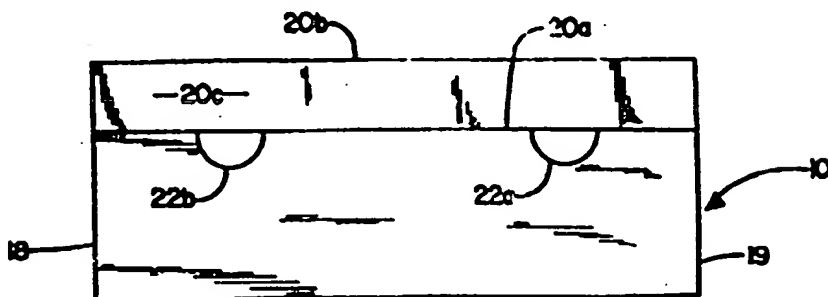


FIG. 5

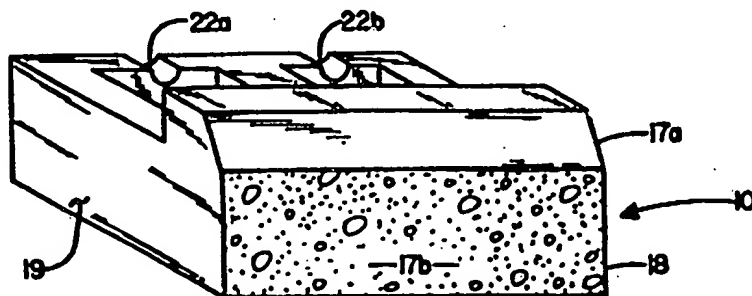


FIG. 6

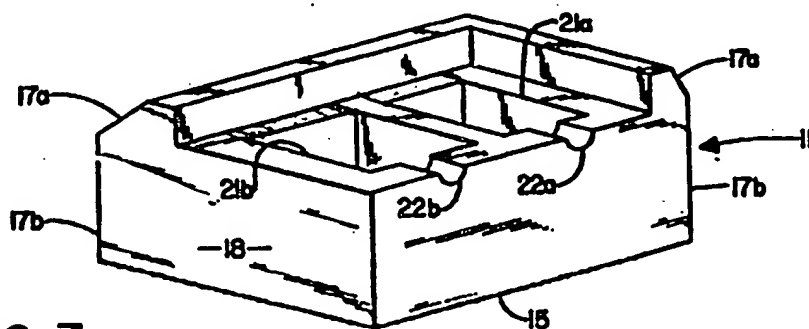


FIG. 7

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